



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,805	10/03/2003	Madhavi Krishnan	UM-07718	3256
23535 7590 07/17/2008 MEDLEN & CARROLL, LLP 101 HOWARD STREET SUITE 350 SAN FRANCISCO, CA 94105			EXAMINER WILDER, CYNTHIA B	
			ART UNIT 1637	PAPER NUMBER
			MAIL DATE 07/17/2008	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/678,805

Applicant(s)

KRISHNAN ET AL.

Examiner

CYNTHIA B. WILDER

Art Unit

1637

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-25, 27-36 and 45-52 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-25, 27-36 and 45-52 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/2/2007 has been entered. Claims 22-24, 27-28, 30-36, 45-52 have been amended. The claims 1-21, 26, 37-44 have been canceled. Claims 22-25, 27-36 and 45-52 are pending.

Previous Rejections

2. The prior art rejection under 35 USC 103(a) as being unpatentable over Sogard in view of Tomishima et al is withdrawn in view of Applicant's amendment of the claims. The prior art rejection under 35 USC 102(b) as being anticipated by Bennet et al is withdrawn in view of Applicant's amendment of the claims.

New Ground(s) of Rejections

THE NEW GROUND(S) OF REJECTIONS WERE NECESSITATED BY APPLICANT'S AMENDMENT OF THE CLAIMS:

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 22-25, 27-29, 31-34, 36 and 45-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bennett et al (citation made of record in prior art Office action) in view of Petersen et al (5958349, September 1999) and further in view of Ririe (20040209331, effective filing date July 16, 2001). Regarding claims 22, 25, 27, 32, 45-47, Bennett et al teach a method comprising: providing a reaction vessel comprising a top and a bottom; a heat source contacting said bottom of said reaction vessel and a solution comprising a plurality of reactants and introducing said solution into said vessel and creating at least one convection cell comprising a temperature differential by applying heat to said bottom of said vessel with a heat source under conditions such that said reactants are thermocycled, thereby forming a reactant product (see 0021-0026, 00032-0034, 0036-0040 and 0048-0049). Bennett et al teach wherein the reaction chamber unit comprises two reaction chamber halves each having a top and bottom and further comprising a plurality of channels in each of the reaction chamber

halves; such that fluids can be repeatedly transferred back and forth from one reaction chamber half (41a) to the other reaction chamber half (41b) (see 0040 and 0042). Bennett et al teach wherein the method and apparatus is use for polymerase chain amplification which inherently suggests the presence of a target and primers in a solution (see entire patent, e.g., 0020, 0021, 0026 and 0034).

Benett does not teach wherein the reaction vessels are configured with an aspect ratio of at least 3.3. However, Benett et al cites Petersen et al which teaches a reaction vessel for heat-exchanging chemical processes having an aspect ratio of at least 2.1 (0009). Petersen et al teach an apparatus for thermal conductance having an aspect ratio of at least 2.1 or higher (see abstract and last paragraph of column 3). Petersen et al further teaches that it is possible to modify the geometry of the reaction vessels and aspect ratio since major faces comprised of materials with high thermal conductivity could be combined with minor faces of low thermal conductivity (col. 3, last paragraph). Thus based on the teachings of Petersen et al, it would be obvious to one of ordinary skill in the art at the time of the claimed invention that the aspect ratio of the reaction vessels could be increased based on the practitioner desired results, desired geometrical designed of the reaction vessels and desired materials for fabrication of the reaction vessel.

While Bennet teaches wherein the reaction chamber comprises two chamber halves, the reference does not expressly teach wherein the method comprises the use of a plurality of separate reaction vessels.

Ririe teaches a thermal cycling system and method of use, wherein said system comprises a plurality of reaction vessels having a top and bottom, wherein said reaction vessels are in fluid communication with one another and allows fluid to be transferred back and forth and further wherein said reaction vessels have heating and cooling means which allows temperature differentials (high temperature zones and lower temperature zones) within the reaction vessels (0010-0012 ; 0040-0043; see also 0044, 0049, 0050). Ririe teaches that the system allows a rapid, automatic and simultaneous varying of temperature of one or more samples in a reaction (0010).

In view of the foregoing, one of ordinary skill in the art at the time of the claimed invention would have been motivated to modify the method and apparatus of Bennett et al in view of Petersen et al to encompass multiple reaction vessels capable of different temperature differential as taught by Ririe for the obvious benefit of rapidly, automatically and simultaneously performing multiple analysis of a sample in an efficient manner as suggested by Ririe.

Regarding claims 23 and 24, Bennett et al teach wherein the channels within the reaction vessels are without corners and wherein the chamber unit are with corners (Figure 4 and 6). Ririe teaches wherein the vessel can be any shape (0011).

Regarding claims, 28, 33, and 48, Benett et al teach wherein said reaction vessel comprises material selected from the group consisting of glass, silicones and metal (0023). Therefore, Benett et al meet the limitations of the claims recited above.

With regards to claims 29, 34 and 49, Ririe teaches wherein said reaction vessels are part of an array (0050).

With regards to claims 31, 36 and 52, Bennett et al teach also providing at least one channel for movement of sample fluids through the differential temperature zones (0023 and Figures 1 and 6). Ririe et al teach microchannels stacked together in sheet format or adjacent each other in a circle to for a disk, herein said channels are in fluid communication with each other (see 0012, Figure 2 and page 10 at claims 25 and 27).

6. Claims 30, 50 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benett et in view of Petersen et al in view of Ririe as applied above and further in view of Sogard (citation made of record in prior Office action). Regarding claims 30, 50 and 51, Benett et al in view of Petersen et al in view of Ririe teach a method of thermocycling comprising the use of an apparatus as described above.

The references do not expressly teach wherein the reaction vessel comprises different temperature differential of at least 5 degrees Celsius in the first reaction vessel or temperature differential of at least 10 degrees Celsius in the second reaction vessel. Ririe teaches however the different reaction vessel may have different temperature zones (0033 and 0047).

Sogard teaches a method and apparatus for thermocycling wherein said method comprising providing a reaction vessel comprising a top and a bottom, a heat source contacting said bottom of said reaction vessel, an active cooling means; contacting said top of said reaction vessel, wherein said cooling means comprising a water bath and a solution comprising a plurality of reactants; introducing said solution into said reaction

vessel; and creating a convection cell by applying heat to said bottom of said vessel with said heat source and cooling said top of said vessel with said cooling means under such conditions that said reactions form a reaction product (Figures 1 and 3, 0013-0014; 0040-0045, 0047 and 0049-0052). Sogard further teaches wherein the apparatus comprises a temperature differential of between 5 degrees and 25 degrees Celsius, more preferably between 5 degrees and 15 degrees Celsius and most preferably a temperature gradient of about 10 degrees Celsius.

In view of the foregoing, it would have been obvious to a person of ordinary skill in the art at the time of the claimed invention to provide different temperature differentials in the different reaction vessels of Bennett et al in view of Petersen and further in view of Ririe et al based on the advantages taught by Ririe that the use of multiple temperature differentials allows for the rapid, automatic and simultaneous multiple analysis of samples in an efficient manner. A person of ordinary skill in the art at the time of the claimed invention would have a good reason pursuing the temperature gradients between 5 and 10 degrees Celsius as taught by Sogard for the benefit of forming a convection cell as taught by Bennett and Sogard. A person with ordinary skill in the art has good reasons to pursue the known option of forming a convection cell using temperature differentials as taught by Sogard for the advantages taught by Bennett. Bennett teaches that the formation of a convection cells in a thermocycling polymerase chain reaction is advantageous because it allows heating and cooling of the PCR sample itself and not other materials (0021); it eliminates the need for active cooling and greatly simplifies the control systems required for PCR systems (0043).

Conclusion

7. No claims are allowed. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CYNTHIA B. WILDER whose telephone number is (571)272-0791. The examiner can normally be reached on a flexible schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on (571) 272-0782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cynthia B. Wilder/
Patent Examiner
Art Unit 1637